REMARKS

I Amendment to the Specification

The paragraph at page 22, lines 18-20 in the specification is amended to correct an obvious omission by adding the word "electron" between the words "scanning" and "microscope," and adding the phrase "at the center and surfaces of the porous film" after the word "microscope." This amendment is supported by the paragraph at page 24, lines 6-17. and Figures 7 and 8. Specifically, the word "electron" is found at page 24, line 7; the phrase "on the surface" is found; the phrase "at the center" is found at page 24, line 12. Support listed here may not be inclusive; support may also be found in other places in the specification. No new matter has been added by this amendment.

II Status of the Claims

Claims 1-4, 6-7, 10, and 15-20 are pending in the application. Claims 1 and 10 have been amended. In claim 1 at line 4, the phrase "at least one surface" is replaced by the phrase "the center and both surfaces." Similarly in claim 10 at line 4, the phrase "at least one surface" is replaced by the phrase "the center and both surfaces." The support for the amendment for claims 1 and 10 can be found in the specification at page 18, lines 19-30. Specifically, the phrase "in the center and both surfaces" can be found at page 18, lines 22-23. Support listed here may not be inclusive; support may also be found in other places in the application. No new matter has been added by this amendment.

III Rejection Under 35 U.S.C. § 102 and § 103

Claims 1-4, 6-7, 10, 15-18 and 20 are rejected under 35 U.S.C. § 102(b) as anticipated by, or in the alternative, under 35 U.S.C. § 103(a) as obvious over Tomioka *et al.* (U.S. Pat. No.: 5,510,395) (*Tomioka*).

According to the Examiner, *Tomioka* discloses a fine porous film of a polyimide having excellent heat resistance and the following characteristics that may be used as an insulating film: (a) the pore size of 0.05 to 10 μm; (b) the porosity of 2 to 70%; (c) the formation from a mixture of pyromellitic dianhydride and diaminodiphenyl ether; (d) the thickness of 5 to 100 μm; (e) the formation by casting; (f) the dielectric constant of 1.5 to 3.0; (g) the gas permeability of zero to 7.0 cm^3/cm^2.sec.cm Hg; and (h) a heat resistant of greater than 200 °C. Therefore, according to the Examiner, these characteristics read on the claimed invention.

With regard to the fine continuous pores, the Examiner acknowledges that *Tomioka* does not specifically disclose a porous structure having fine continuous pores reaching to both surfaces of the film. However, the Examiner believes that the *Tomioka* film is substantially identical to the claimed invention, and therefore would inherently possess the fine continuous pores reaching to both surfaces as claimed by the Applicants. In addition, the Examiner maintains that the claimed fine continuous pores reaching to both surfaces of the film would have obviously been present once the porous polyimide film of *Tomioka* was provided.

With regard to a heat shrinkage of no greater than ± 1%, the Examiner assumes that *Tomioka* is substantially identical to the claimed invention, and would therefore inherently possesses a heat shrinkage of no greater than 1%.

The Examiner further states that if the prior art structure is capable of performing the intended use as a battery separator, then it meets the claim of the invention. Therefore, although *Tomioka* does not specifically disclose being used as a battery separator, the Examiner concludes that *Tomioka* either literally or inherently reads on all of the structural limitations of claims 1 and 15, and therefore reads on Applicants' claimed battery separator.

With respect to claims 16 and 17, the Examiner concludes that *Tomioka* discloses using pyromellitic dianhydride and a diaminodiphenylether.

With respect to claims 18 and 20, the Examiner argues that, although *Tomioka* does not specifically disclose pores in the porous structure arranged in the film substantially parallel to the film surface, the *Tomioka* film inherently possesses pores in the porous structure arranged in the film substantially parallel to the film surface.

In addition, the Examiner rejects claim 19 under 35 U.S.C. § 103(a) as being unpatentable over *Tomioka* and further in view of Makino *et al.* (U.S. Pat. No.: 4,474,662) (*Makino*). The Examiner contends that *Makino* discloses that both 3,3',4,4'-biphenyltetracarboxylic dianhydride and pyromellitic dianhydride may be used as the aromatic tetracarboxylic acid compound. As a result, the Examiner reasons that it would have been obvious to the skilled artisan to use 3,3',4,4'-biphenyltetracarboxylic dianhydride in place of the pyromellitic dianhydride of *Tomioka*.

In light of the current amendment and the following remarks, Applicants respectfully traverse the Examiner's rejection of claims 1-4, 6-7, 10 and 15-20 for the reasons presenting hereinafter.

The Claimed Invention

The claimed invention relates to a porous insulating film that comprises fine continuous pores that reach to both surfaces. This porous insulating film, fabricated by film casting, is further characterized with heat resistance, low dielectric constant and dielectric loss, excellent insulating properties and able to laminate itself.

Tomioka

Tomioka does not disclose a porous structure having fine continuous pores reaching to both surfaces of the film. Rather, *Tomioka* is directed to a film-forming solution, a porous film obtained from the film-forming solution and a coated material with the porous film (column 1, lines 7-10). *Tomioka* discloses a variety of porous films, ranging from those having no gas permeability (10^{-7} cm^3/cm^2.sec.cm Hg or less) to those having high gas permeability (0.1 cm^3/cm^2.sec.cm Hg or more). According to *Tomioka*, these types of porous films can be produced because porosity and pore size can be controlled by changing the combination and the mixing ratio of the poor solvents (*see* column 4, lines 47-54).

Makino

Makino does not disclose a porous structure having fine continuous pores reaching to both surfaces of the film. Instead, *Makino* discloses a process for producing porous aromatic polyimide membrane which exhibits an enhanced permeating rate of a gas or liquid substance and a separating property for a gas or liquid mixture, and therefore is useful as a separate of the

gas or liquid mixture and as a concentrator of the gas or liquid substance (*see* column 3, lines 3-9).

Discussion

(A) The Invention Has Pores that Are in the Center and on Both Surfaces

The claimed invention is directed to a porous insulating film comprises fine continuous pores that are in the center and reach to both surfaces of the film. For instance, in Example 1, the resulting porous polyimide was observed with a scanning electron microscope, and found to have fine curved continuous pores, a thickness of 40 μm, an average pore size of 0.5 μm and a maximum pore size of no greater than 10 μm "on the surfaces," an average pore size in the range of 0.01-2 μm and a maximum pore size of no greater than 10 μm "at the center," a porosity of 60%, a resistance to passage of air of 190 sec/100 cc, ... (*see* page 24, lines 6-17).

In contrast, *Tomioka* does not disclose a porous insulating film comprises fine continuous pores that are in the center and reach to both surfaces of the film. Examples 5-10 in *Tomioka* disclose porous films having a dense surface at one side. For instance, in Example 5, the porous film was observed to have a large number of elliptic pores having "a length of 2 to 3 μm and a width of 1 μm were found in the film but only at the half in contact with the copper; the remaining half of the film was found to be a fine and uniform layer" (*see* column 12, lines 4-7), which exhibits substantially no gas permeability. Examples 1-4 in *Tomioka* disclose a porous film having hydrogen gas permeability and hydrogen/nitrogen separation ratio of 2 or more (*see* column 11, lines 31-34; and Fig. 1), which indicates a gas separation performance.

It has been known that a porous film must have pores of the size of several nm or less in order to have a gas separation performance. Therefore, Examples 1-4 in *Tomioka* must have pores of several nm or less. Accordingly, the porous film according to the claimed invention is different from and not anticipated by the porous film according to *Tomioka*. The film according to the invention has pores in the center and on both surfaces of the film and has pore size not less than 0.01 μm. The film according to the Examples 5-10 in *Tomioka* have a dense surface on one side of the film. The film according to the Examples 1-4 in *Tomika* have pores size of less than 0.01 μm and therefore exhibits gas separation performances.

Therefore, the claimed invention is not anticipated by *Tomioka*. Applicants respectfully request that the rejection of claims 1-4, 6-7, 10, 15-18 and 20 under 35 U.S.C. § 102(b) be withdrawn.

(B) Gas Permeability But No Gas Separation Performance

The claimed invention is not obvious over *Tomioka* and *Makino* because the porous films according to the claimed invention exhibit good gas permeability but no gas separation performance. In contrast, *Tomioka* teaches a film with gas permeability and gas separation performance (*see* column 11, lines 31-34). Similarly, *Makino* also teaches a porous film useful as a separator of the gases or liquid substances (*see* column 3, lines 3-9).

Examples 1-4 in *Tomioka* disclose a porous film having hydrogen gas permeability and hydrogen/nitrogen separation ratio of 2 or more (*see* column 11, lines 31-34; and Fig. 1), which is a gas separation performance. Examples 5-10 in *Tomioka* disclose porous films having a dense surface at one side only. For instance, in Example 5, the porous film was observed to have a large number of elliptic pores having "a length of 2 to 3 μm and a width of 1 μm were found in the film but only at the half in contact with the copper; the remaining half of the film was found to be a fine and uniform layer" (*see* column 12, lines 4-7), which exhibits substantially no gas permeability. In summary, the films disclosed in *Tomioka* are densely populated with pores either on only one side of the film, or alternatively, having a size of less than 0.01 μm at all pores. In either case, they are different than those recited in the claimed invention.

It has been known that a porous film must have pores of the size of several nm or less in order to have a gas separation performance. Therefore, in a porous film having a mean pore size of 10 nm (i.e. 0.01 μm) or more, there will be no gas separation.

According to MPEP § 2143, to establish a *prima facie* case of obviousness, three basic criteria must be met: "First, there must be some suggestion or motivation, either in the references themselves or in the knowledge generally available to one of ordinary skill in the art, to modify the reference or to combine reference teachings. Second, there must be a reasonable expectation of success. Finally, the prior art reference (or references when combined) must teach or suggest all the claim limitations."

There is no suggestion or motivation, in *Tomioka* or *Makino*, taken individually or in combination, to modify the porous film in either *Tomioka* or *Makino*, so that the modified film would not have the gas separation performance. Also, there is no suggestion or motivation in the knowledge generally available to one of ordinary skill in the art to modify *Tomioka* or *Makino* so that the modified film according to *Tomioka* or *Makino* would not have the gas separation performance. Such modifications would render either *Tomioka* or *Makino* inoperable as porous film for the separation of gases.

On the other hand, the combination of the two references does not make up the deficiency in either one of them. The use of 3,3',4,4'-biphenyltetracarboxylic dianhydride, recited in *Makino*, in place of the pyromellitic dianhydride, recited in *Tomioka*, would not have changed the *Tomioka* film to become the film according the invention that has no gas separation performance. Similarly, the use of pyrmellitic dianhydride, recited in *Tomioka*, in place of 3,3',4,4'-biphenyltetracarboxylic dianhydride, recited in *Makino*, would not have changed the *Makino* film to become the film according the invention that has no gas separation performance.

Therefore, Applicants respectfully request that the rejection of claims 1-4, 6-7, 10, 15-18 and 20 under 35 U.S.C. § 103(a) as unpatentable over *Tomioka* be withdrawn. Also, Applicants respectfully request that the rejection of claim 19 under 35 U.S.C. § 103(a) as unpatentable over *Tomioka*, further in view of *Makino*, be withdrawn.

Applicants enclose a article "For Users of Film Separation Technology," edited by Matsumoto Kanji, Chemical Engineering Society, Tokyo, Japan (1996) (ISBN 4-526-03849-0) and a partial English translation of the paragraph at page 58 starting at lines 16. The purpose of this article is to show that a porous film must have pores of a size of several nm or less in order to have a gas separation performance. Therefore, porous films having a larger mean pore size of 10 nm (0.01 μm) are not known for gas separation performance.

III Conclusion

In view of the foregoing remarks, Applicants respectfully request reconsideration of the subject application and timely allowance of the pending claims. Should the Examiner feel that there are any issues outstanding after consideration of this response, the Examiner is invited to contact Applicant's undersigned representative to expedite prosecution.

Except for issue fees payable under 37 C.F.R. §1.18, the Commissioner is hereby authorized by this paper to charge any additional fees during the entire pendency of this application including fees due under 37 C.F.R. §§1.16 and 1.17 which may be required, including any required extension of time fees, or credit any overpayment to Deposit Account No. 50-0310. This paragraph is intended to be a **CONSTRUCTIVE PETITION FOR EXTENSION OF TIME** in accordance with 37 C.F.R. §1.136(a)(3).

Respectfully submitted,

MORGAN, LEWIS & BOCKIUS LLP

Dated: March 19, 2003

By: Lynn E. Eccleston

Lynn E. Eccleston
Reg. No. 35,861

MORGAN, LEWIS & BOCKIUS LLP
CUSTOMER NO. 009629
1111 Pennsylvania Ave., N.W.
Washington, D.C. 20004
Phone: (202) 739-3000
Fax: (202) 739-3001